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Optimizing a long-term groundwater monitoring network using geostatistical methods

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Abstract Groundwater long-term monitoring (LTM) is required to assess groundwater remediation and human health risk at sites with severe groundwater contamination. Groundwater LTM network optimization requires sampling at existing wells, data management, remediation, and risk reduction activities, costing millions of Euros. The study of monitoring network optimization was performed at a site in Eastern Germany using the geostatistical temporal spatial (GTS) algorithm in a 2.5D environment. The 2.5D environment assumes that there are multiple aquifers or hydrostratigraphic layers in the aquifer. An area of ~72 km^2 with 357 wells in the Tertiary aquifer and 462 wells in the Quaternary aquifer was selected. A dataset of the concentration of monochlorobenzine from October 2003 to December 2009 was obtained for optimizing the existing network. Local 3D geological and hydrogeological models were used to understand the spatial and temporal hydrogeological heterogeneity of the area. The optimal number and placement of wells in the existing network has been analysed for effective groundwater monitoring.

Key words groundwater long-term monitoring network optimization; multiple objectives approach; geostatistical methods